

Appendix G

Estimation of “Per Panel” and Industry-wide Cost Increases for Phase 1 and Phase 2

A. Hardwood Plywood (HWPW)

A.1. Per Panel Cost Increase vs. UF panel

General Assumptions for Potential Cost Increases

- Wholesale cost of a panel made with UF resin = \$20.00 (averaged from prices listed on the Pittsburgh Forest Products website)
- Per panel cost increases are due increases in resin and labor cost; cost for wood, other additives, etc. remain unchanged
- Resin accounts for 5% of the cost of the UF panel = \$1.00
- Labor accounts for 19% of the cost of the UF panel = \$3.80

A.1.a. Phase 1: How it Might Be Met for HWPW

- Optimize press-related operations
- Slight modifications to existing UF resins – add scavengers (< 5%) or co-blend with low mole ratio UF resin (< 1.0)

A.1.a.i. Projected Resin-related Cost Increase for Phase 1 HWPW

- Resin Cost (\$/lbs): UF = \$0.24; (UF + 4% Melamine) = \$0.30; Low UF co-blend = \$0.28
- % increase in cost for (UF + 4% Melamine) = 25%; ∴ (UF + 4% Melamine) resin cost = \$1.25
- % increase in cost for Low UF co-blend = 15%; ∴ Low UF co-blend resin cost = \$1.15
- Increase in panel price for (UF + 4% Melamine) = \$0.25
- Increase in panel price for Low UF co-blend = \$0.15

A.1.a.ii. Projected Labor-related Cost Increase for Phase 1 HWPW

- None – assumes that use of the above resins constitutes “drop-in technology”

A.1.a.iii. Potential Wholesale Panel Price for Phase 1 HWPW

- (UF + 4% Melamine) = \$20.25 (1% increase)
- Low UF = \$20.15 (1% increase)

A.1.a.iv. Conclusion for Phase 1 HWPW

- Potential cost increase for producing a Phase 1 panel is about 1% -- used 5% to calculate industry-wide cost to bracket the upper-end cost

A.1.b. Phase 2: How it Might Be Met for HWPW

- Builds on the operations-related improvements made for Phase 1
- Candidate resin systems would be either PVA or (UF + 15% Melamine)

A.1.b.i. Projected Resin-related Cost Increase for Phase 2 HWPW

- Resin Cost (\$/lbs): UF = \$0.24; (UF + 15% Melamine) = \$0.465; PVA = \$1.00
- % increase in cost for (UF + 15% Melamine) = 94%; \therefore (UF + 15% Melamine) resin cost = \$1.94
- % increase in cost for PVA = 317%; \therefore PVA resin cost = \$4.17
- Increase in panel price for (UF + 15% Melamine) = \$0.94
- Increase in panel price for PVA = \$3.17

A.1.b.ii. Projected Labor-related Cost Increase for Phase 2 HWPW

- (UF + 15% Melamine) and PVA: 15% increase in labor cost = $(\$3.80 \times 1.15) = \4.37
- Change in panel price due to labor increase = \$0.57

A.1.b.iii. Potential Wholesale Panel Price for Phase 2 HWPW

- (UF + 15% Melamine) = $(\$20.00 + \$0.94 + \$0.57) = \21.51 (8% increase)
- PVA = $(\$20.00 + \$3.17 + \$0.57) = \23.74 (19% increase)

A.1.b.iv. Conclusion for Phase 2 HWPW

- Potential cost increase for producing a Phase 1 panel is about 8 to 19% -- used 15% to calculate industry-wide cost to bracket the upper-end cost

A.2. Potential Industry-wide Cost Increase for HWPW

General Assumptions for Potential Cost Increases

- California HWPW consumption = 299-million ft^2 = 9.4-million 4' x 8' panels
- Cost increase for Phase 1 = 5% per panel (i.e., \$1.00 per panel)
- Cost increase for Phase 2 = 15% per panel (i.e., \$3.00 per panel)
- % of production affected in Phase 1 = 60% (40% of U.S. production already complies with the Phase 2 standard)
- % of production affected in Phase 2 = 60% (40% of U.S. production already complies with the Phase 2 standard)

A.2.a. Potential Industry-wide Cost Increase for HWPW

- Phase 1: $(9.4\text{-million} \times \$1.00 \times 0.60) = \$5.6\text{-million}$
- Phase 2: $(9.4\text{-million} \times \$3.00 \times 0.60) = \$16.8\text{-million}$

B. Particleboard (PB)

B.1. Per Panel Cost Increase vs. UF panel

General Assumptions for Potential Cost Increases

- Wholesale cost of a panel made with UF resin = \$10.50 (from price listed in Random Lengths)
- Per panel cost increases are due increases in resin and labor cost; cost for wood, other additives, etc. remain unchanged
- Resin accounts for 30% of the cost of the UF panel = \$3.15
- Labor accounts for 19% of the cost of the UF panel = \$2.00

B.1.a. Phase 1: How it Might Be Met for PB

- Optimize press-related operations
- Slight modifications to existing UF resins – add scavengers (< 5%) or co-blend with low mole ratio UF resin (< 1.0)

B.1.a.i. Projected Resin-related Cost Increase for Phase 1 PB

- Resin Cost (\$/lbs): UF = \$0.24; (UF + 4% Melamine) = \$0.30; Low UF co-blend = \$0.28
- % increase in cost for (UF + 4% Melamine) = 25%; ∴ (UF + 4% Melamine) resin cost = \$3.94
- % increase in cost for Low UF co-blend = 15%; ∴ Low UF co-blend resin cost = \$3.62
- Increase in panel price for (UF + 4% Melamine) = \$0.79
- Increase in panel price for Low UF co-blend = \$0.47

B.1.a.ii. Projected Labor-related Cost Increase for Phase 1 PB

- None – assumes that use of the above resins constitutes “drop-in technology”

B.1.a.iii. Potential Wholesale Panel Price for Phase 1 PB

- (UF + 4% Melamine) = \$11.79 (7% increase)
- Low UF co-blend = \$10.97 (4% increase)

B.1.a.iv. Conclusion for Phase 1 PB

- Potential cost increase for producing a Phase 1 panel is about 4% to 7% -- used 5% to calculate industry-wide costs to bracket the mid to upper end cost

B.1.b. Phase 2: How it Might Be Met for PB

- Builds on the operations-related improvements made for Phase 1
- Candidate resin systems would be either PF or (UF + 8% Melamine)

B.1.b.i. Projected Resin-related Cost Increase for Phase 2 PB

- Resin Cost (\$/lbs): UF = \$0.24; (UF + 8% Melamine) = \$0.36; PF = \$0.48
- % increase in cost for (UF + 8% Melamine) = 50%; \therefore (UF + 50% Melamine) resin cost = \$4.73
- % increase in cost for PF = 100%; \therefore PF resin cost = \$6.30
- Increase in panel price for (UF + 8% Melamine) = \$1.58
- Increase in panel price for PF = \$3.15

B.1.b.ii. Projected Labor-related Cost Increase for Phase 2 PB

- (UF + 8% Melamine) and PF: 10% increase in labor cost = $(\$2.00 \times 1.1) = \2.19
- Change in panel price due to labor increase = \$0.19

B.1.b.iii. Potential Wholesale Panel Price for Phase 2 PB

- (UF + 8% Melamine) = $(\$10.50 + \$1.58 + \$0.19) = \12.27 (17% increase)
- PF = $(\$10.50 + \$6.30 + \$0.19) = \13.84 (32% increase)

B.1.b.iv. Conclusion for Phase 2 PB

- Potential cost increase for producing a Phase 1 panel is about 17% to 32% -- used 30% to calculate industry-wide cost to bracket mid to upper end cost

B.2. Potential Industry-wide Cost Increase for PB

General Assumptions for Potential Cost Increases

- California PB consumption = 622-million ft^2 = 19.5-million 4' x 8' panels
- Cost increase for Phase 1 = 5% per panel (i.e., \$0.53 per panel)
- Cost increase for Phase 2 = 30% per panel (i.e., \$3.15 per panel)
- % of production affected in Phase 1 = 45% (55% of U.S. production already complies with the Phase 1 standard)
- % of production affected in Phase 2 = 100% (0% of U.S. production already complies with the Phase 2 standard)

B.2.a. Potential Industry-wide Cost Increase for PB

- Phase 1: $(19.5\text{-million} \times \$0.53 \times 0.45) = \$4.6\text{-million}$
- Phase 2: $(19.5\text{-million} \times \$3.15 \times 1.00) = \$61.3\text{-million}$

C. Medium Density Fiberboard (MDF)

C.1. Per Panel Cost Increase vs. UF panel

General Assumptions for Potential Cost Increases:

- Wholesale cost of a panel made with UF resin = \$14.00 (from price listed in Random Lengths)
- Per panel cost increases are due increases in resin and labor cost; cost for wood, other additives, etc. remain unchanged
- Resin accounts for 27% of the cost of the UF panel = \$3.78
- Labor accounts for 19% of the cost of the UF panel = \$2.66

C.1.a. Phase 1: How it Might Be Met for MDF

- Optimize press-related operations
- Slight modifications to existing UF resins – add scavengers (< 5%) or co-blend with low mole ratio UF resin (1.0 to 1.1)

C.1.a.i. Projected Resin-related Cost Increase for Phase 1 MDF

- Resin Cost (\$/lbs): UF = \$0.24; (UF + 4% Melamine) = \$0.30; Low UF co-blend = \$0.28
- % increase in cost for (UF + 4% Melamine) = 25%; ∴ (UF + 4% Melamine) resin cost = \$4.73
- % increase in cost for Low UF co-blend = 15%; ∴ Low UF co-blend resin cost = \$4.35
- Increase in panel price for (UF + 4% Melamine) = \$0.95
- Increase in panel price for Low UF co-blend = \$0.57

C.1.a.ii. Projected Labor-related Cost Increase for Phase 1 MDF

- None – assumes that use of the above resins constitutes “drop-in technology”

C.1.a.iii. Potential Wholesale Panel Price for Phase 1 MDF

- (UF + 4% Melamine) = \$14.95 (6% increase)
- Low UF co-blend = \$14.57 (4% increase)

C.1.a.iv. Conclusion for Phase 1 MDF

- Potential cost increase for producing a Phase 1 panel is about 4% to 6% -- used 10% to calculate industry-wide cost to bracket upper end cost

C.1.b. Phase 2: How it Might Be Met for MDF

- Builds on the operations-related improvements made for Phase 1
- Candidate resin systems would be either MDI or (Low UF (< 1.0) + 12% Melamine)

C.1.b.i. Projected Resin-related Cost Increase for Phase 2 MDF

- Resin Cost (\$/lbs): UF = \$0.24; (Low UF + 12% Melamine) = \$0.46; MDI = \$1.40
- % increase in cost for (Low UF + 12% Melamine) = 90%; \therefore (Low UF + 12% Melamine) resin cost = \$6.62
- % increase in cost for MDI = 483%; \therefore MDI resin cost = \$22.05
- Increase in panel price for (Low UF + 12% Melamine) = \$3.40
- Increase in panel price for MDI = \$18.27

C.1.b.ii. Projected Labor-related Cost Increase for Phase 2 MDF

- (Low UF + 12% Melamine) and MDI: 30% increase in labor cost = $(\$2.66 \times 1.3) = \3.46
- Change in panel price due to labor increase = \$0.80

C.1.b.iii. Potential Wholesale Panel Price for Phase 2 MDF

- (Low UF + 12% Melamine) = $(\$14.00 + \$3.40 + \$0.80) = \18.20 (30% increase)
- MDI = $(\$14.00 + \$18.27 + \$0.80) = \33.07 (136% increase)

C.1.b.iv. Conclusion for Phase 2 MDF

- Potential cost increase for producing a Phase 1 panel is about 40% -- used 40% to calculate industry-wide cost to bracket upper end cost for (Low UF + 12% Melamine); wide-scale use of MDI is not anticipated but is provided for comparison

C.2. Potential Industry-wide Cost Increase for MDF

General Assumptions for Potential Cost Increases

- California MDF consumption = 277-million ft^2 = 8.7-million 4' x 8' panels
- Cost increase for Phase 1 = 10% per panel (i.e., \$1.40 per panel)
- Cost increase for Phase 2 = 40% per panel (i.e., \$5.60 per panel)
- % of production affected in Phase 1 = 75% (25% of U.S. production already complies with the Phase 2 standard)
- % of production affected in Phase 2 = 100% (0% of U.S. production already complies with the Phase 2 standard)

C.2.a. Potential Industry-wide Cost Increase for MDF

- Phase 1: $(8.7\text{-million} \times \$1.40 \times 0.75) = \$9.1\text{-million}$
- Phase 2: $(8.7\text{-million} \times \$5.60 \times 1.00) = \$48.5\text{-million}$

D. Combined Industry-wide Cost Increase

D.1. Potential Phase 1 Cost Increase

- Phase 1 for HWPW: $(9.4\text{-million} \times \$1.00 \times 0.60) = \$5.6\text{-million}$
- Phase 1 for PB: $(19.5\text{-million} \times \$0.53 \times 0.45) = \$4.6\text{-million}$
- Phase 1 for MDF: $(8.7\text{-million} \times \$1.40 \times 0.75) = \$9.1\text{-million}$
- Combined: $(\$5.6 + \$4.6 + \$9.1) = \19.3-million

D.2. Potential Phase 2 Cost Increase

- Phase 2 for HWPW: $(9.4\text{-million} \times \$3.00 \times 0.60) = \$16.8\text{-million}$
- Phase 2 for PB: $(19.5\text{-million} \times \$3.15 \times 1.00) = \$61.3\text{-million}$
- Phase 2 for MDF: $(8.7\text{-million} \times \$5.60 \times 1.00) = \$48.5\text{-million}$
- Combined: $(\$16.8 + \$61.3 + \$48.5) = \127-million

E. References

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